Isabel S. Gephart

isabel.gephart@nih.gov | igephart@colgate.edu | 607.351.6705

EDUCATION

Colgate University, Hamilton, NY
Bachelor of Arts, GPA: 3.53/4.00, May 2022
Double Major: Applied Mathematics and Neuroscience

RESEARCH EXPERIENCE

National Institute of Mental Health, NIH, Bethesda MD
Section on Functional Imaging Methods, Laboratory of Brain and Cognition
Post baccalaureate IRTA Research Fellow, Summer 2022-Present
PI: Dr. Peter Bandettini, PhD
Advisors: Dr. Javier Gonzalez-Castillo, Dr. Tyler Morgan

- Recruited, scheduled, and acquired over 150 fMRI scans during first year in the lab by staying organized and clearly and effectively communicating with research subjects.
- Led project to investigate the behavioral and neural factors influencing audiovisual integration in the brain using the Audiovisual Bounce Effect.
- Programmed experimental stimuli and response logging for audio-visual integration fMRI paradigm using Python libraries and the Psychopy software.
- Operated Siemens 7T MRI scanner, performing high order shimming, anatomical acquisitions, functional MRI acquisitions, and concurrent physiological recordings.
- Analyzed task and resting-state fMRI data using a variety of tools: dcm2bids, AFNI, FreeSurfer, nilearn, and connectome predictive modeling.
- Adapted complex PCA algorithm and applied it to a publicly available dataset to explore the contribution of slow, repetitive spatiotemporal patterns of activity to covert cognition during rest.
- Presented work from projects at national (Society for Neuroscience 2023) and international conferences (Organization for Human Brain Mapping 2023, abstract submitted for 2024).

Colgate University Neuroscience Program, Hamilton, NY
Senior Research Thesis, Fall 2021-Summer 2022
PI: Dr. Bruce Hansen, PhD

- Honors Neuroscience Thesis: *Modeling goal-driven perceptual representations through brain-supervised sparse reconstruction.*
- Investigated how a person's goal affects the compression of visual information in the brain using EEG and a previously developed brain-supervised sparse coding model implemented in MATLAB.
- Recruited, scheduled, and collected EEG data from 20 undergraduate research volunteers, each completing 1-4 sessions.
- Mentored younger RA students in the lab and taught them to acquire high quality EEG data.
- Wrote work into senior thesis paper and presented it to the Neuroscience Department during thesis defense, earning the distinction of honors.
- Presented work at the 2022 Visual Sciences Society Annual Meeting in St. Pete Beach, FL.

Colgate University Neuroscience Program, Hamilton, NY
Undergraduate Student Researcher, Summer 2021
PI: Dr. Bruce Hansen, PhD

- Awarded funding to work in the Vision and Perception lab at Colgate University for the summer.
- Advanced existing theoretical model of sparse image reconstruction for compatibility with EEG data and improved biological plausibility.

Colgate University Mathematics Program, Hamilton, NY
Senior Research Thesis, Spring 2021
PI: Dr. Ahmet Ay, PhD

- Applied Mathematics Thesis: *Decoding Charismatic and Non-charismatic Perceptions Using a Multivariate Analysis of EEG Data.*
- Identified features in time-resolved power from EEG signals that identify charismatic perception while participants watched political leaders speak from a previously collected data set.
- Utilized machine learning, specifically Support Vector Machines, in both MATLAB and Weka to identify the frequencies most predictive of charismatic perception.
- Presented results to research seminar and wrote a final paper that explained the findings and necessary future steps.

AWARDS

National Institute of Mental Health Travel Award Recipient, Fall 2023
National Institutes of Health Postbaccalaureate Poster Day Outstanding Poster Award, Spring 2023
National Institutes of Mental Health Three Minute Talk Competition Finalist, Summer 2023
Honors in Neuroscience, Spring 2022
Dean's Award with Distinction for Academic Excellence, Three semesters
Dean's Award for Academic Excellence, Two semesters
Most Valuable Athlete, Colgate University Women's Rowing, Spring 2022
Teammate of the Year Award, Colgate Varsity Women's Rowing, Spring 2021
Raider Award, Colgate Varsity Women's Rowing, Spring 2019

TEACHING EXPEREINCE

Colgate University Neuroscience Program, Hamilton, NY
*Computational Neuroscience Tutor***,** Fall 2021

- Guided students from different academic backgrounds through homework assignments and in-class exercises by explaining coding strategies and neuroscience concepts in accessible terminology.
- Prioritized understanding the content beyond completion of assignments by offering designated help sessions to grant extra support in the rigorous course.

Ithaca City School District, Ithaca, NY (remote)
Private Algebra 1 Tutor, Spring 2021

- Individually tutored 8th grade Algebra 1 students to support learning while school was remote due to COVID-19.
- Corrected homework and led practice problems to improve their understanding of the material while keeping them engaged even when they were very discouraged.

VOLUNTEER EXPERIENCE

Colgate SAT Coaches, Hamilton, NY
*Math Tutor***,** Winter 2019-Spring 2021

- Developed creative ways to engage a class of five underprivileged high school students in SAT Math prep course, resulting in improved scores on the post-course exam.
- Won "Coach of the Week" distinction multiple times for high student success and engagement.
- Prioritized concepts students were struggling with as well as targeted learning methods to work through particularly challenging problems.

LEADERSHIP EXPERIENCE

Colgate Women's Varsity NCAA Division I Rowing, Hamilton, NY
Captain, Spring 2020-Spring 2022
Coxswain, Fall 2018-Spring 2022

- Earned the respect of teammates and coaches through hard work and dedication to be elected Captain for junior and senior seasons.
- Developed strong organizational, interpersonal, and time management skills as the only captain to a team of 45 people, while also balancing a difficult course load.
- Led and supported the team through two challenging years during the COVID pandemic by keeping them motivated and focused, resulting in the two highest rankings in the past decade.
- Selected as coxswain for the top varsity boat all four years of college by demonstrating strong leadership abilities, communication skills, and clear thinking under pressure.

ADDITIONAL RELEVANT COURSEWORK

Foundation for Advanced Education in the Sciences (Academic Programs at NIH), Bethesda MD

- Human Neuroscience, *Grade: A-,* Fall 2022
- Applied Machine Learning Course, *Grade: A+*, Fall 2023
- Advanced Applications of Artificial Intelligence, *Ongoing*, Winter 2023

Pennsylvania State University, State College, PA

- Ordinary Differential Equations Online Course, *Grade: B+,* Summer 2020

SKILLS

Laboratory: EEG acquisition, fMRI acquisition (operation of 7T Siemens scanner, anatomical and functional data acquisition), physiological recordings (cardiac, respiratory, blood pressure), concurrent eye tracking and fMRI, efficient subject recruitment, scheduling conformant to IRB protocol.
Analysis: AFNI (task and rest), dcm2bids, FreeSurfer, Connectome Predictive Modeling, Functional Connectivity.
Computer: Python (pandas, numpy, nilearn), Machine Learning (Scikit-learn, TensorFlow), MATLAB, R, Unix, SPSS, Excel, Psychopy, optimization of functional imaging pipelines for running on high performance computing systems.
Others: Strong oral and written communication, excellent time management, mentoring of younger scientists.

POSTER PRESENTATIONS

Isabel S. Gephart, Javier Gonzalez-Castillo, Megan A. Spurney, Daniel A. Handwerker, Peter A. Bandettini (*Submitted*, Summer 2024). *Contribution of slow, brain-wide patterns of activity to on-going experience in resting-state fMRI.* Organization for Human Brain Mapping, Seoul, South Korea.

Renzo Huber, Rüdiger Stirnberg, Chung (Kenny) Kan, Philipp Ehses, Kenshu Koiso, Susan Wardle, **Isabel S. Gephart**, Nadine N Graedel, Sam Audrain, Andrew Persichetti, A Tyler Morgan, and Peter Bandettini (*Submitted*, Spring 2024). *Layer-fMRI in lower brain structures: why is it so hard and what can we do about it?* International Society for Magnetic Resonance in Medicine, Singapore.

Isabel S. Gephart, A. Tyler Morgan, Javier Gonzalez-Castillo, Daniel A. Handwerker, Peter A. Bandettini (Winter 2023). *Behavioral and neural factors underlying perception of the audiovisual bounce effect*. Society for Neuroscience Annual Meeting, Washington, DC.

A Tyler Morgan, **Isabel S. Gephart**, Daniel A. Handwerker, Javier Gonzalez-Castillo, Peter A. Bandettini. (Winter 2023) *A functionally time-resolved reconstruction technique for high-resolution fMRI.* Society for Neuroscience Annual Meeting, Washington, DC.

Isabel S. Gephart, A. Tyler Morgan, Javier Gonzalez-Castillo, Daniel A. Handwerker, Peter A. Bandettini (Fall 2023). *Behavioral and neural factors underlying perception of the audiovisual bounce effect*. NIMH Training Day 2023, Washington, DC.

Isabel S. Gephart, A. Tyler Morgan, Javier Gonzalez-Castillo, Daniel A. Handwerker, Peter A. Bandettini (Summer 2023). *Multiple factors influence perception in the audiovisual bounce effect*. Organization for Human Brain Mapping, Montreal, Canada.

Renzo Huber, Rüdiger Stirnberg, David A Feinberg, Steen Moeller, Essa Yacoub, Federico de Martino, Samantha J Ma, Philipp Ehses, Omer Faruk Gulban, Jonathan R Polimeni, Kenshu Koiso, A Tyler Morgan, **Isabel S. Gephart**, Emily Ma, Sam Audrain, Andrew Persichetti, Alexander JS Beckett, Tony Stöcker, Benedikt A Poser, Peter Bandettini. (Summer 2023) *Fuzzy ripple artifacts in layer-fMRI EPI: Towards better layer-fMRI data with Dual-polarity readouts.* Organization for Human Brain Mapping, Montreal, Canada.

Renzo Huber, Rüdiger Stirnberg, David A Feinberg, Steen Moeller, Essa Yacoub, Federico de Martino, Samantha J Ma, Philipp Ehses, Omer Faruk Gulban, Jonathan R Polimeni, Kenshu Koiso, A Tyler Morgan**, Isabel S. Gephart**, Emily Ma, Sam Audrain, Andrew Persichetti, Alexander JS Beckett, Tony Stöcker, Peter Bandettini, Benedikt A Poser. (Summer 2023). *Low special frequency ripple artifacts in layer-fMRI EPI: Identification, cause, and mitigation strategies with Dual-polarity readout*. International Society for Magnetic Resonance in Medicine, Toronto, CA.

Isabel S. Gephart, A. Tyler Morgan, Javier Gonzalez-Castillo, Daniel A. Handwerker, Peter A. Bandettini. (Spring 2023). *A behavioral and fMRI investigation of the audiovisual bounce effect.* Postbaccalaureate Poster Days, National Institutes of Health, Bethesda, MD.

Hansen, B. C., **Gephart, I. S.,** Gobo, V. E., Greene, M. R., Field, D. J., (Summer 2022). *Uncovering the spatiotemporal dynamics of goal-driven efficient coding with a brain-supervised sparse coding network*. Cognitive Computational Neuroscience, San Francisco, CA.

Hansen, B. C., **Gephart, I. S.,** Gobo, V. E., Greene, M. R., Field, D. J., (Summer 2022). *How do behavioral goals shape the spatiotemporal evolution of the sparse code for scenes?* Vision Science Society, St. Pete Beach, FL.

ORAL PRESENTATIONS

Isabel S. Gephart, (Fall 2023) *A behavioral analysis of the audiovisual bounce effect*, NIMH Training Day Three Minute Talks, Washington, DC

Isabel S. Gephart, (Summer 2023). *A behavioral analysis of the audiovisual bounce effect*, NIMH Three Minute Talk Competition, Bethesda, MD